Expandable tubulars and casing drilling are options

EXPANDABLE TUBULAR technology is providing more completion options and certain casing drilling operations are becoming standard.

A session at the 2002 IADC/SPE Drilling Conference, 26-28 Feb in Dallas, focuses on the latest developments and recent field experience with these two advancing technologies. The session is chaired by **M B Stone, Big 6 Drilling Co** and **J Smith, Weatherford International Inc.**

CASING DRILLING

Until recently, drilling with casing had not been applied economically to mainstream drilling operations. But since early 2000, developments have made drilling down surface casing a standard operation in several parts of the world.

The enabling technology has been a drillable drill bit, or "Drill Shoe." Unlike conventional bits, which are inherently non-drillable, this tool is constructed from soft alloy and contains a cutting structure that does not damage the next bit in the hole.

IADC/SPE paper 74547 reports a project by a major operator to evaluate drilling with casing on the Gulf of Mexico shelf.

"Rotary Drilling With Casing: A Field Proven Method of Reducing Well Construction Costs," was prepared for the Drilling Conference by **M T Wardley, Weatherford BBL; W R Protas, Tengizchevroil; J L Howard, Chevron USA Inc;** and **J Bain** and **J Z Thompson**, Weatherford BBL.

The Drill Shoe method is the first truly "single-trip" technique of drilling with casing; nothing is pulled out of the hole. It allows operators to simultaneously drill and install casing in one operation. Cementing can begin immediately upon reaching TD.

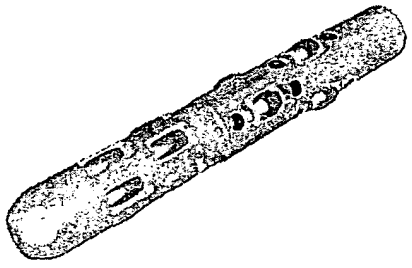
The next drill string is run in conventional manner and drills out the shoe track and Drill Shoe without damage to the drill bit and then proceeds to drill the next section of wellbore.

Since its first use in January 2000, more than 130 drilling-with-casing operations have been completed successfully with this technology, the authors report. Casing sizes range from 7-in. to 20-in., with run lengths up to 1,500 ft. Benefits have included reduced trip time, elimination of hole problems and improved safety.

ROTARY EXPANSION

Expandable tubular technology has so far been dominated by one expansion technique: forcing a solid cone or pig through a tubular. Now an alternative expansion method is gaining significance: the use of tools that are rotated inside the expandable tubulars.

IADC/SPE paper 74548 outlines the development of the rotary expansion technique. In "The Applications of Rotary Expansion to Solid Expandable Tubulars," the authors discuss the benefits of rotary expansion, including high contact force; low rolling friction; low axial loads; and tolerance to dimensional anomalies of the expandable tubular and of the parent casing. The technology also facilitates top-down expansion.



Rotary expansion tool provides high contact force, low rolling friction and low axial loads.

The paper was prepared by **S J Harrall, A M Duggan** and **G L Innes, Weatherford International Inc.**

EXPANDABLE SAND SCREEN

Shell UK recently set 3 new world records in expandable tubular technology application in 6-in. horizontal hole. IADC/SPE paper 74549 describes the operations. "Expandable Sand Screen: Three New World Records in Shell UK's Brigantine Field," was prepared by **A E Weekse** and **S H Grant**, Shell E&P UK.

Deployment and expansion of 4,000 ft of 4-in. Expandable Sand Screens (ESS) in Brigantine B surpassed the previous record tenfold. Deployment of 7,000 ft of 4-in. ESS in Brigantine A involved fully expanding 4,920 ft of the screen. Finally, the modified Compliant Rotary Expansion System [CRES] was used for full primary expansion of the bottom 60 ft of the 2,150-ft ESS in Brigantine C.

Brigantine is a small offshore gas field located 100 miles northeast of Bacton in the Southern North Sea and contains three small hydrocarbon-bearing blocks long deemed individually uneconomical. The application of new technologies, Deliver the Limit [DtL] concept and teamwork turned these "marginal" accumulations into a viable project.

ESS was preferred to conventional sand control methods like gravel pack due primarily to the larger bore it provides and the high potential to eliminate annular space when fully expanded against the wellbore.

The 3 wells were completed 32 days ahead of plan and achieved initial production rates of 30% above expectation with total added value of £13.5 million.

USING STANDARD CASING

Casing drilling places demands on the casing string that are normally only required of drill string components. Casing is used only once, so solutions must be less costly than for drill pipe.

IADC/SPE alternate paper 74550 describes technologies that have been developed to address 3 casing drilling performance needs: increased torque, wear protection and centralization. "Adapting Standard Casing for Casing Drilling" was prepared by **M W Slack, Noetic Engineering Inc; P G Angman, Tesco Corp;** and **T M Kaiser**, Noetic Engineering Inc.

To circumvent premium connections, multi-lobe rings were developed to grip the coupling center bore and form shoulders for the pins, significantly increasing the torque capacity of standard-tolerance API connections without compromising thread seal performance.

Wear protection for casing collars and centralization of the casing string have been achieved by attaching devices to the casing with a rapidly installed crimped connection that provides high torque capacity and prevents axial movement. ■